



REMR TECHNICAL NOTE CS-MR-1.1

CONCRETE REMOVAL TECHNIQUE: CUTTER BOOM



A cutter boom as pictured above has been used for removal of deteriorated concrete at Brandon Road Lock, Illinois Waterway

PURPOSE: To provide information on the cutter boom, a new concrete cutting tool, and its use for concrete removal.

APPLICATION: The cutter boom employs the rotary action and mass of its cutter bits to route wide cuts into concrete surfaces. It has been successfully used at Brandon Road Lock on the Illinois Waterway to scale loose concrete fragments from freshly blasted surfaces and to remove concrete that was cracked and weakened by an expansive agent. It was also successfully used at Brandon Road as the sole method of removal for some areas of deteriorated and sound concrete in which some of the concrete contained ties and wire mesh.

ADVANTAGES: On large concrete removal jobs, this technique can be relatively fast and cheap when compared with conventional concrete removal techniques. Other advantages include well-defined limits of concrete removal, relatively small, easy-to-handle debris, and simplicity of operation.

LIMITATIONS: Limitations or disadvantages of the cutter boom include large electric power demand, limited mobility resulting from dragging a heavy power cable around a congested construction site, and dust. The water spray nozzles on the cutter head did not appear adequate for dust suppression, making it "difficult or impossible to work downwind" of the device, according to contractor personnel. Also, it is impossible for the operator to see the cutter head when working from the top of the lock wall.

Thus far, all cutter boom kits supplied by the manufacturer (Excavation and Tunneling Equipment Corporation or ETE) have been electrically driven, but hydraulically driven cutter heads can be made available. This modification, according to contractor personnel, would significantly increase mobility of the system.

PERSONNEL REQUIREMENTS: According to the operator at Brandon Road Lock, "anyone that can operate a backhoe can operate the cutter boom."

EQUIPMENT: The cutter boom kit used by the contractor at Brandon Road Lock was provided by ETE Corporation, State College, PA. ETE provides cutter boom kits from 55 to 215 hp that can be custom fitted to most common backhoe excavators. The 165-hp version used at Brandon Road was mounted on a Caterpillar Model 235 excavator. The device was powered by a 165-hp electric motor which runs on 440 volts AC and draws approximately 220 amps under load. A 165-hp-rated transmission reduces the output speed to the cutter head assembly. A specially designed structural frame for mounting the electric motor and transmission was fastened to the Model 235 excavator using the existing stick pins. The 26-in.-diam cutter head, which has 108 cutter bits, rotates at 82 rpm. The electric motor is water cooled with an open-loop cooling system that uses spray nozzles directed toward the cutter head for dust suppression. The main electrical enclosure was mounted on the swing frame, and the operator's control station was mounted in the cab area.

According to ETE, the performance characteristics of the 165-hp cutter boom working in concrete are as follows:

Concrete Strength <u>psi</u>	Net Cutting Rate <u>cu yd/hr</u>	Bit Costs <u>¢/cu yd</u>	Maintenance Costs per Year <u>(Single-Shift Operation)</u>
5000-6000	10-15	50	\$15,000

REFERENCES: a. Mining tool adapted to concrete removal for lock wall rehabilitation project. W. E. Parr. In: The REMR Bulletin, Vol 2, No. 1, Mar 1985, US Army Engineer Waterways Experiment Station, Vicksburg, MS.